



Public and Private Transformer Vaults

April 2002

This Client Assistance Memo (CAM) provides information for anyone interested in the design, construction, permit, and inspection requirements related to public and private transformer vaults located inside buildings. The CAM serves as a reference guide to relevant Seattle Building and Mechanical Code provisions, Seattle City Light contacts, and other technical resources to address issues related to transformer vault design and construction.

Summary of Important Codes and Standards

Seattle Building Code and Seattle Mechanical Code

- Section 414, Transformer Vaults: Transformer vaults are required for oil-insulated private transformers or other private transformers rated over 35,000 volts which are located inside a building. This section provides minimum requirements for fire resistive construction, number of openings, opening protection, opening location, ventilation, and drainage, among other requirements.
- Appendix Chapter 4, Division III, Utility Transformer Vaults: Appendix 4 applies to transformer vaults housing transformers owned by Seattle City Light. This appendix states that Seattle City Light shall approve the size, location, and layout of utility transformer vaults, and provides minimum requirements for fire resistive construction, number of openings, opening protection, opening location, ventilation, and drainage, among other requirements.

NOTE: Fire-resistive construction requirements may be met using a variety of construction materials (e.g., concrete masonry unit walls, formed concrete walls, etc.). Seattle City Light may require applicants to use a specific type of construction that exceeds the minimum fire-resistance requirements (e.g. formed concrete walls), due to the weight of electrical service components that may be hung on the walls inside the transformer vault or due to other structural and safety considerations.

- Ventilation requirements: The Seattle Building Code provides requirements for ventilation of both public and private transformer vaults.
- Limits on location of exhaust duct terminations: Both the Seattle Building Code and Seattle Mechanical Code limit the location of transformer vault exhaust duct terminations.

Seattle Electrical Code

- Article 450: Applies to vaults housing private transformers. Provides additional requirements for transformers and transformer vaults based on transformer type.

Seattle City Light Construction and Connection Standards

As early as possible in project development, contact the Seattle City Light Service Center for the area where your project is located regarding these requirements (see geographic divisions and telephone numbers at the end of this CAM). Information on Requirements for Electric Service Connections is also available online at www.ci.seattle.wa.us/light/contractors/resc.

Permits Required

- Building Permit
- Mechanical Permit (when not included as part of building permit application)
- Electrical Permit

Basic Construction Requirements

Following is a summary of basic construction requirements for most transformer vault installations, including notes on the City's construction, maintenance, or operational preferences. Plans should note whether the transformer vault is a private or public transformer. This summary is not a substitute for the complete requirements as set forth in the City codes noted above.

Fire Resistive Construction

- Minimum three-hour fire resistive construction, including exhaust shaft to point of termination and three-hour rated door assemblies. Typically required to conform to Seattle City Light specifications, which may exceed minimum building code requirements for three-hour rated construction.
- Minimum three-hour rated automatic closing fire damper (functioning at 165°F/92°C) required at vault air intake opening if opening is interior to the building.
- Fire dampers are not allowed in the exhaust duct.

Ventilation

- For mechanically ventilated vaults, fans must be located outside the vault to supply positive or negative pressure, i.e., in supply or exhaust ducts, and shall be controlled by a thermostat in the vault.
- NOTE 1:** Negative pressure/exhaust ventilation systems are preferred.
- NOTE 2:** Where intake louvers are provided, the louvers may be controlled by the fan thermostat and must be maintained from outside the vault. Be aware that such systems must be maintained to ensure proper and continued operation.
- For transformer vaults in garages, the air intakes must be at least 18 inches above the garage floor outside of the vault.
 - Exhaust terminations must be at least 10 feet from exits, 10 feet from the property line, 10 feet from unprotected/operable openings into the building, and 10 feet from a mechanical air intake. (Same as garage exhaust units.)

Fire Department/Fire Marshal's Office

- Sprinkler systems and sprinkler heads are not allowed in transformer vaults.

- Transformer vaults shall have independent ventilation controls separate from the rest of the building.
- In R-1 occupancies and highrise buildings (buildings with occupied floors over 75 feet above the lowest level of fire department vehicle access), heat detectors shall be located on the ceiling immediately above or near the transformer vault door and be in accordance with heat detector spacing requirements of National Fire Protection Association 72, National Fire Alarm Code. Location of the heat detector must also be coordinated with Seattle City Light.

Inspection Responsibilities

Department of Design, Construction and Land Use

- Jurisdiction: Everything out from the inside face of the transformer vault walls, floor, and ceiling.
- Plans Examiner and Building Inspector checks fire-resistive construction requirements for transformer vault walls, floors, ceilings, and ventilation shafts. Special inspection may be required to verify certain types of concrete construction.
- Plans Examiner and Mechanical Inspector checks exhaust termination location, ventilation fan, fire dampers, fan motor efficiency, and other applicable Energy Code requirements.
- Electrical Inspector checks electrical connections, wiring, service, etc. for private transformer vaults, and applicable Energy Code requirements for transformers. This staff also inspects the service bus stub into the vault.

Seattle City Light

- Jurisdiction: Everything inside utility transformer vaults, including electrical connections and equipment racks; there are also electrical ground grid and grounding conductor requirements outside the vault as necessary.
- Seattle City Light will inspect to see that the service requirement specifications have been met and will verify that construction of the vault meets the design requirements.

NOTE: Building Inspectors approve transformer vault for Building Code compliance, not compliance with Seattle City Light design requirements.

Seattle Fire Department/Fire Marshal's Office

- Jurisdiction: Transformers installations in R-1 occupancies and highrise buildings.
- Seattle Fire Department Inspector checks for heat detectors in proper locations and no sprinkler heads in vault.

NOTE: Seattle City Light must also approve the location of heat detectors within the vault.

For More Information**Department of Design, Construction and Land Use**

- Building Code Technical Backup: (206) 684-4630
- Mechanical/Energy Code Technical Backup: (206) 684-7846
- Inspection Requests: (206) 684-8900

Seattle City Light

- North Electrical Services—North of Denny Way (206) 615-0600
- South Electrical Services—South of Denny Way (206) 386-2400
- Downtown Network Services—(206) 684-3000
- Account Executive Office, Major customers—(206) 684-3331
- Requirements for Electrical Service Connections: www.ci.seattle.wa.us/light/contractors/resc/

Seattle Fire Department

- Fire Marshal's Office: (206) 386-1450

Access to Information

Links to electronic versions of DCLU **Client Assistance Memos (CAMs)**, **Director's Rules**, and the **Seattle Municipal Code** are available on the "Publications" and "Codes" pages of our website at www.cityofseattle.net/dclu. Paper copies of these documents, as well as additional regulations mentioned in this CAM, are available from our Public Resource Center, located on the 20th floor of Key Tower at 700 Fifth Avenue in downtown Seattle, (206) 684-8467.

PLEASE NOTE: DCLU public information documents should not be used as substitutes for codes and regulations. Details of your project should be reviewed for specific compliance by DCLU staff.